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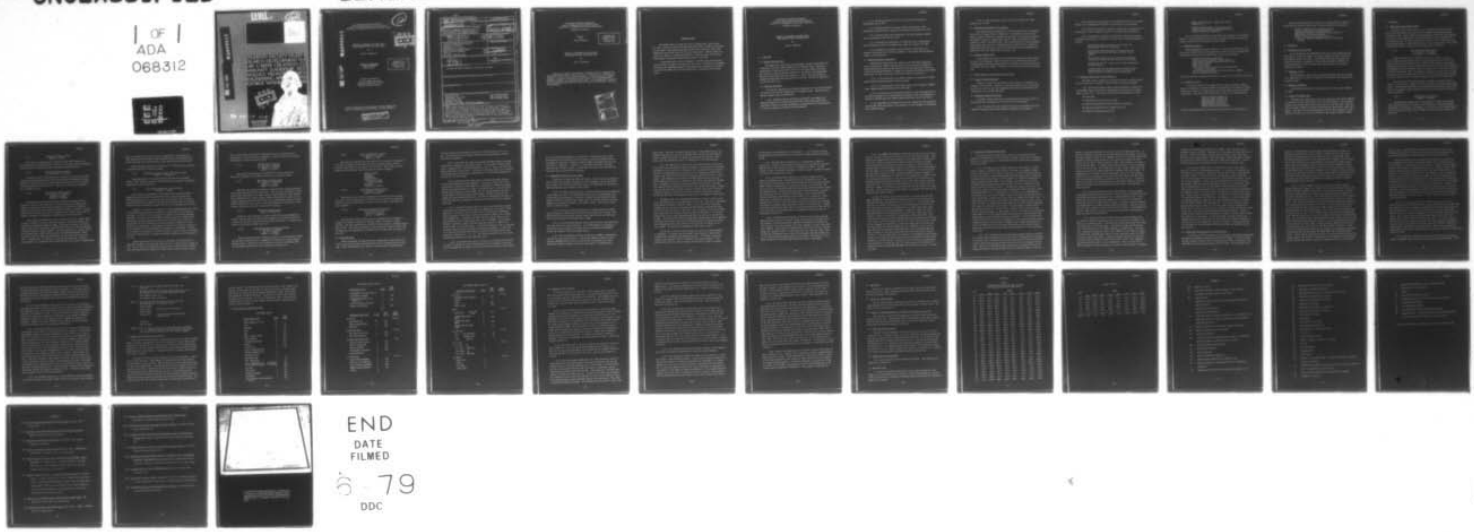

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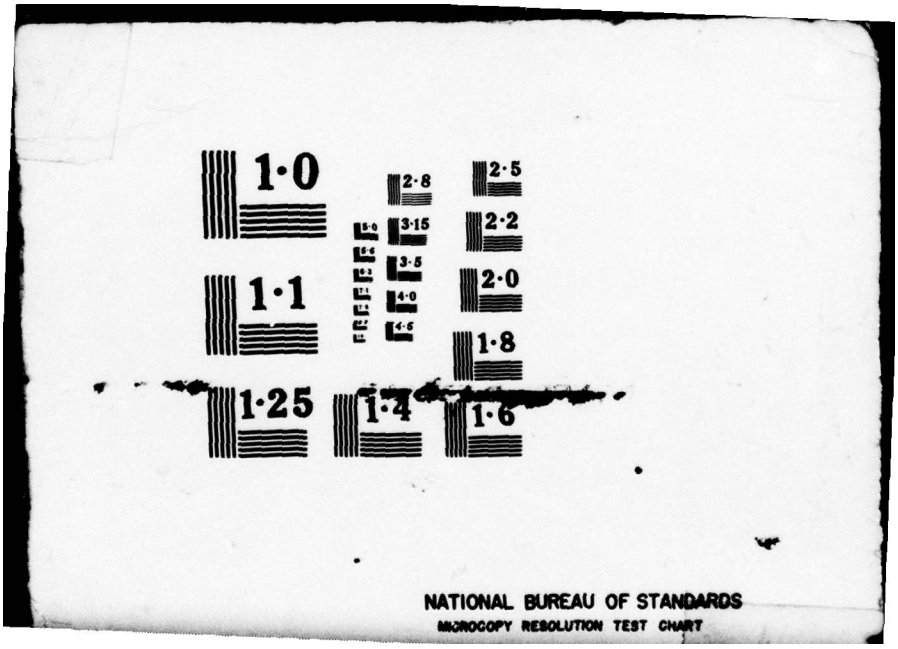
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THE GEORGE WASHINGTON UNIVERSITY
School of Engineering and Applied Science
Institute for Management Science and Engineering

CREATING A PERSONNEL DATA BASE WITH A TIME DIMENSION FOR THE MARINE CORPS

by

Ross E. Tomlinson

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This paper examines the problem of computing rates of occurrence of certain kinds of personnel events in the U. S. Marine Corps. It details the results of a study which included interviews of various groups of manpower planners, a survey of currently used data bases, and an investigation of existing procedures for computing these rates. It concludes that a new data base is needed and describes both the data base and methods of creating and updating it.

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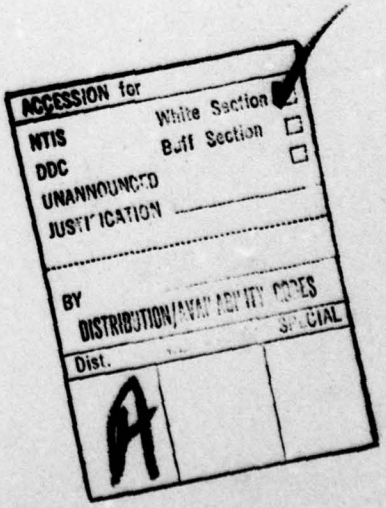

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A particular debt is owed to Captain M. J. Hester who worked closely with the author throughout the period of this study. In addition to arranging interviews and gathering documents, he brought to our discussions his experience with the COHORT file and the computation of enlistment and attrition rates.

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1. OBJECTIVES

1.1 General task objective.

The objective of this study is to determine the data requirements for a Statistical Retrieval System (SRS) and Rate Generator (RG). The SRS is envisioned as a system which will extract selected Type Change Code (TCC) data records or portions of data records from the files of the Transaction Retrieval System (TRS) and resort them into a format that is conducive to immediate mathematical and statistical manipulation. The task is defined in a study directive [13].

1.2 Specific objectives.

Six specific objectives are stated in Paragraph 3 of the study directive and they are the specific objectives of the present study. Results for each objective appear below in Section 4.8.

1.2.1 Determine present and future statistical requirements and determine whether the 77 Type Transaction Codes (TTC) which generate the historical records of the TRS are adequate or superfluous for the generation of the data elements to satisfy those requirements.

1.2.2 Determine which of the TTC's in any future TRS should be incorporated into an SRS.

1.2.3 Determine which of the data elements that make up a TRS statistical record should be included in the statistical records of an SRS.

1.2.4 Determine what other information from other manpower related data bases should be included in an SRS.

1.2.5 Determine the feasibility of reconstructing or reformatting past statistical records and including them among the records of an SRS.

1.2.6 Determine the manpower related rates for which there is a continual requirement for statistical analysis. These rates will permanently reside on the proposed RG.

1.3 Computer resource constraints.

The objectives given above are subject to the following constraints on core storage use, maximum elapsed execution time, and use of peripheral input-output devices based on job turnaround time and frequency of job runs, using the IBM System/360 Model 65 Computer at Headquarters, Marine Corps (HQMC). The effects of these constraints are discussed below in Section 4.8.

1.3.1 If turnaround time is 24 hours, maximum core storage is 150,000 bytes, maximum elapsed execution time is one hour.

1.3.2 If turnaround time is one week, maximum core storage is 200,000 bytes, maximum elapsed execution time is two hours.

1.3.3 If the job is to be processed monthly or less frequently and if one week is allowed for the scheduling and execution of the job, maximum core storage is 200,000 bytes and maximum elapsed execution time is four hours.

1.3.4 Regardless of turnaround time or the frequency of job execution, no more than three tape drives, fifty cylinders of disc storage, or three disc areas should be used.

1.3.5 If these constraints cannot be met, the Control Data 6600 Computer will be used.

1.4 Balancing responsiveness with economy.

The Study Directive, Paragraph 4C, further requires that the designers must strike a balance between a system that is responsive in terms of the amount of data available for analysis and one that is economical in terms of the required number of storage devices and in terms of the amount of time required to update and extract data. More specifically, TTC's and associated data elements that are to be incorporated into an SRS should be limited to those high usage items which are of particular importance and significance. Results for this item appear below in Section 4.8.

1.5 Changes to MMS or TRS.

If any changes are proposed to the Manpower Management System (MMS) or to any of its subsystems, such as the TRS, any anticipated benefits to be accrued must be carefully weighed against the manpower assets and other costs associated with such changes. Results for this item appear below in Section 4.8.

2. MAJOR FACTORS AND FACTS BEARING ON THE STUDY

2.1 Uses of the SRS data base.

Section 1 stated that the object of this study was to identify the elements of a data base. Section 2 is concerned with the uses to which the data base is to be put and the requirements which must be satisfied by the system which will use that data base.

2.2 Required capabilities of SRS.

The major factors delineated in the study directive which relate to the SRS are four requirements on the data base to be developed.

2.2.1 The data base must provide the data for the production of all required recurring reports with suitable flexibility for expansion.

2.2.2 The data base must support the production of all "as required" reports in any aggregation and degree of selectivity of data elements.

2.2.3 The data base must be capable of supporting the production of aggregations of data suitable for input to the proposed Rate Generator.

2.2.4 The SRS must be capable of producing a System Status Report (SSR) when the data base is updated. There are five requirements placed on the SSR.

The SSR must produce the number of records in the system before and after each update.

The SSR must produce the number of transactions, by transaction type, that have been processed at each update.

The SSR must include an error report which summarizes the types of errors that were detected at each update.

The SSR must include a report of all records containing detected errors.

In connection with the production of the SSR, the SRS should possess the capability either to rectify the errors detected or to delete the erroneous data.

2.3 Required capabilities of Rate Generator.

The major factors supplied in the study directive concerning the RG are the requirement to produce a Rate Dictionary and Analyst Reports.

2.3.1 The Rate Dictionary shall contain background information on each resident rate and statistical information based on the most current update of the rates. Seven types of statistical requirements are given.

The rate name.

A description of how each rate is used.

An abstract discussing the characteristics of each rate.

The SRS data elements used to compute each rate.

The method of calculating each rate.

Sample characteristics: sample size, period, comments, etc.

Statistical information: an estimate of the current value of each rate with supporting descriptive statistical information.

2.3.2 The Analyst Reports to be produced will provide a more detailed display of the data extracted from the SRS to include the values of the data elements used to make calculations from each sample.

2.4 Existing data bases.

Under Paragraph 5, Specific Guidance, in the study directive there are the names of eight data bases with which the designers are to be familiar and which should be surveyed for applicability to the current project.

Transaction Retrieval System (TRS)
Recruit Accession Management System (RAMS)
Commissioning Accession Management System (CAMS)
Cohort File (COHORT)
Officer Lineal File
Joint Uniform Military Pay System (JUMPS)/Manpower Management System (MMS)
Reserve Personnel Management Information System (REPMIS)
Retired Pay/Personnel System

These data bases were surveyed with results as presented in Sections 4.2 and 4.3.

2.5 Prospective users.

It is also required by the study directive that the primary users of manpower information from MMS at HQMC be interviewed for the purpose of determining their information requirements, particularly their present and future requirements. The names of six divisions are given in the study directive.

Assistant Chief of Staff, G-1
Assistant Chief of Staff, G-3
Assistant Chief of Staff, G-4
Deputy Chief of Staff (Air)
Deputy Director of Personnel
Director, Data Systems Division

Each of these divisions was interviewed as described below in Section 4.1.

Since the study directive was drawn up, a reorganization of HQMC has renamed the six divisions listed above. The new names are, respectively:

Director, Manpower Plans and Policy Division
Director, Training and Education Division
Deputy Chief of Staff for Installations and Logistics
Deputy Chief of Staff for Aviation
Director of Personnel Management Division
Director of Information Systems Support and Management Division

3. ASSUMPTIONS

3.1 Continuity of MMS and TRS.

It is assumed that the JUMPS/MMS system and its major subsystem, TRS, will continue to exist as Class I data bases although the data records may be changed in format and content. MMS and TRS have been on line for over two years now and are integrated to some extent with RAMS and REPMIS and totally with JUMPS. These five data bases contain almost all the data collected on a Marine.

3.2 Expansion of TRS.

The TRS subsystem may acquire new Type Change Codes (TCC) as a result of a redefinition of the list of "critical" TTC's and may lose some TCC's for a similar reason.

3.3 Hardware continuity.

The IBM System 360 Model 65 will continue to be the on-site computer for HQMC.

3.4 Choice of computer site.

Because of the large volume of new data generated each month by MMS/TRS and because this data represents all the "critical" changes to the personnel records, any new SRS system created will need to access this data. This new data is stored at HQMC and is used for updating the Inquiry File, among other things. SRS will be more easily managed and thereby more responsive to the needs of the users if it can be installed on the computer resident in HQMC.

4. DISCUSSION

4.1 Interviewing the potential users.

The first step in the study was to set up appointments for interviews with the various groups listed in 2.5 for the purpose of discovering their information needs. These interviews were approached without any preconceptions of the form of the proposed SRS. The groups themselves had had little time for preparation for our visits with the result that a lot of information items were gathered during the talks that later were found inappropriate to the system concept which evolved. Results of the thirteen interviews follow.

4.1.1 MPP Program and Budget Section
Lt. Colonel S. A. Chalgren
Lt. Colonel W. E. McKinstrey

Budget estimates must be provided for one and a half to two years ahead. Among the complicating factors are the sociological facts that first term Marines are now marrying earlier, having children earlier, and acquiring household goods earlier, thereby increasing the costs associated with allowances to dependents and with permanent change of station moves. Needs were cited for up-to-date information about marriage rates, dependent rates, permanent change of station rates, early ship-over, mean time to failure in boot camp, man-days to failure, failure rates in flight training, average time on station (MCC).

At any one time 23% of end strength is engaged in training either as student or as instructor, making the cost of training a relatively large budget factor. Any enlistees that have to be separated soon after first entry or who have to be recycled through training one or more times increase the training costs perceptibly.

4.1.2 MPP Manpower Plans Section
Captain T. G. German

The particular interest here is in avoidance of additional training costs associated with new recruits by the retention of careerists through reenlistment or extension. A careerist, in this instance, is a Marine having four or more years of active duty as shown in the data element Active Duty Base Date.

4.1.3 MPP Manpower Plans Section
Major J. W. Bower

Major Bower is concerned with a promotion model which requires the data elements Active Duty Base Date, Fiscal Year of Service, Rank (at beginning of fiscal year), occupational field, and numbers promoted by grade.

4.1.4 MPP Plans and Systems Section
1st Lieutenant J. L. Young

Lieutenant Young is concerned with an enlisted structuring model which requires the data elements Grade, Active Duty Base Date, Occupational Field, Fiscal Year of Service, Rank (at the beginning of the fiscal year) and number promoted by grade and year of service. Loss rates by the above categories are of primary interest.

4.1.5 MPP Plans and Systems Section
Lt. Colonel A. A. Spurlock
Major W. E. Smith
Major A. W. Hitchens

This group is concerned with officer promotions and requires data elements to provide total commissioned service, total active service, MOS, number of voluntary and involuntary separations of Limited Duty Officers (LDO) by grade and MOS, total enlisted service of officers, regular or reserve status, date of augmentation, date of separation, LDO status, aviator status, number of resignations and number of involuntarily retired aviators.

Major Smith is interested in loss or retention rates for a model which requires a breakdown by source, MOS, and category. Some of the sources are the Enlisted Commissioning Program (ECP), the service academies, the Platoon Leaders Class (PLC), the Officer Candidate Course (OCC), and the Navy Enlisted Scientific Education Program (NESEP). Among the categories are ground, pilot, Naval Flight Officer (NFO), lawyer, women, and Limited Duty Officer (LDO). He further needs the number of officers who, having reached the end of year (n-1) , complete year n , broken out by grade and year group. Specific data elements are: separation code, active duty base date, date of commissioning,

kind of commission, entry source, date of augmentation, dates promoted, date dropped from active duty, reason dropped, primary and additional MOS, grade, duty type, pay entry base date, armed forces active duty base date.

Major Hitchens requires, for the model P^3, attrition rates by years of commissioned service and time in grade.

4.1.6 MPC Manpower Control Branch, Allocation Section
Major J. J. Whitehouse

Major Whitehouse is the analyst who operates the RIP and STRAFE models. These rates are listed in the Rate Dictionary and will be discussed separately in a later subsection.

4.1.7 MPI Manpower Management Research Section
Major D. L. Young

Major Young is responsible for the Policy Impact Evaluation Model (IMPACT) and the Enlisted Population Model which is under construction. IMPACT requires loss rates, accession rates and promotion rates so that it may project the present population forward with principal regard for filling billets by MOS and finding the proper recruits at the beginning of the chain.

Recruits are assigned to occupational fields (OCCFLD) mostly as a result of ACB and/or AQB test scores, the length of enlistment, and the length of training. The OCCFLD is the high order two digits of the MOS and therefore represents a collection of related MOS's having the same two leading digits. Test scores and mental group are needed in the SRS data base so that the past history of the percentages of each mental group's assignment to each OCCFLD can be determined. The assignment of recruits is somewhat restricted by the guarantee of certain OCCFLD's as a condition of enlistment. However, if an enlistee is guaranteed an OCCFLD for which a tour at a school is required and if the enlistee fails to complete the school satisfactorily, the guarantee is void.

Major Young would like to be able to determine the distribution of population by MOS at any particular date and also the average time in grade by MOS. Date of entry into the Marine Corps would be a useful new data element, since Pay Entry Base Date (PEBD) may include reserve time and other services

time. He would like to be able to distinguish between an extension and a reenlistment. He will also need to compute a careerist survival rate and the distribution of future accessions by MOS.

4.1.8 MMEA MMS Support Section
Lt. Colonel P. Yadlowski
Lt. Colonel R. L. Shafer
Major C. E. Davis

This group's main interest in the SRS/RG is in the production of enlistment, promotion, and non-EAS attrition rates by MOS and grade.

4.1.9 MMCP Career Planning Branch
Lt. Colonel J. L. McManaway
Major M. J. Lucci
Major R. D. Sortino

This group is now getting much of its information by pulling individual record books from the central record files. They are most interested in educational level, proficiency and conduct scores, fitness reports, courts-martial data, dependents data, marital status, whether reenlistment is broken or continuous, EAS losses by month and by MOS, early reenlistments, amount of actual service obtained from two-, three-, four-year enlistees, extensions of active service, ACB scores, and source entry code for officers.

4.1.10 MPI MMS Procedures Section
Major E. W. Brown III

Unlike the other interviews in this section this one was primarily to acquaint ourselves with the content and procedures of the RAMS file and not to find out what data content the SRS data base should have. It will be discussed in the section on data files, 4.3.

4.1.11 ISMD Systems Design and Program Section
Lt. Colonel D. G. Williams
Mr. S. S. Sickels
MGYSGT J. A. Bloesch

Several visits were made to this group which is concerned with the MMS and TRS data files and which is responsible for all the 100 or more regular monthly reports. Since they were not potential users of the SRS data base, the information gained there will be discussed in Section 4.3.

4.1.12 AAZ Crew Requirements Section
Lt. Colonel W. E. Wilson
Major R. M. Rose

This group is concerned with the creation of a projected training plan to produce the numbers of personnel in each occupational field or MOS to match the requirements of the current five-year plan. Their needs are principally to have attrition rates broken down by seven categories:

Reserve release
Resignation
Retirement
Death/MIA/POW
Revocation of DIFOT
(leaving air MOS)
Discharge
Promotion to Colonel

4.1.13 AAZ Technical Training Section
Lt. Colonel J. B. Wuertz
Major R. K. Goforth

This group is the enlisted counterpart of the Officer Unit discussed in 4.1.12. Their principal needs are attrition rates for first termers and careerists by each aviation MOS, attrition rates in schools, and length of time in schools.

4.1.14 MTMT Training Requirements Section
Lt. Colonel F. R. Allen
Major J. E. Masters
Major F. R. Soderstrom

The principal concern of this group is training loads by category of training, for example, specialized training, flight training, or recruit training. They need attrition rates by MOS in order to get the training requirements by MOS. Other items are amount of time lag between failure at boot camp and discharge, the distribution of failures over training days, and causes of attrition.

4.2 Data base types.

Before discussing the HQMC data bases individually we will look at the various types of data bases represented there and the characteristics of each type. These characteristics are set when a new data base is conceived and

created and they are determined by the uses to which the data set is to be put. We will discuss only the types time-slice, historical event, limited historical, and history.

4.2.1 A time-slice data file is one which describes certain characteristics of its members at a particular moment. It is sometimes called a snapshot or inventory file. The characteristics at time n may or may not be the same as they were at time (n-1) . If they are different, there is no reference in the data base to the previous characteristics. The MMS file discussed in Section 4.3 is of this type.

4.2.2 A historical event data file is one which describes changes in the characteristics of some population. It may be so brief that it contains only the identity of the member of the population to which it pertains and the new characteristic or it may be so detailed that it includes all the previous characteristics of the member, the new characteristics, the cause of the change, the date and time of the change, secondary effects of the change, and many possible other items. The TRS file discussed in Section 4.3 is of this type and is somewhere in between the brief and detailed examples given here.

4.2.3 A limited historical data file can be constructed by choosing a limited set of historical event types and aggregating all records of these types from a historical event data file into a new data file, sequencing them in the most useful manner. This has been done by HQMC in the creation of the COHORT file. The particular cohort in this case is made up of all male enlisted Marines serving their first term in the USMC. This excludes officers, reservists, women, and those with prior service in USMC or in another branch of the armed forces. It includes draftees as well as enlistees. The event types are those concerned with joining or dropping. In practice it is made up of selected data elements from all TRS records having a TCC whose first character is A or R . This file has proven to be very useful in gathering statistics on this important group.

4.2.4 A historical file is one in which, over a well-defined interval of time, all changes of certain characteristics are recorded in such a way that the history of the subject of the data record can be fully reconstructed

as far as those characteristics are concerned. If only the order in which the changes occur is important, then an initial state and an ordered series of changes of value with a scheme to identity which data element has the new value will be sufficient. Usually, it is desirable to be able to measure time duration of values as well. In this case, the date or the time and the date must also be recorded with the change.

4.3 Applicability of current data bases.

In Section 2.4 nine data files were listed. Each of these was surveyed with an eye to its possible usefulness in the definition of an SRS data base. Four of these were briefly examined and found to be impertinent to the problem. The remaining five were studied in great detail.

4.3.1 The Officer Lineal File data records contain little that appertains to the problem at hand. It contains name, grade, date of commissioning, date of rank and exists primarily to indicate an officer's relative position with regard to others of the same rank. Other than the relative position, the data elements are obtainable elsewhere, for example, in MMS. This file is essentially a time-slice type.

4.3.2 The Reserve Personnel Management Information System or REPMIS was not examined in detail since it concerns only records for reserves. The SRS will not be concerned with reserves except when they are on active duty and in that case their records will exist in MMS.

4.3.3 The Retired Pay/Personnel System files were also discarded since they deal only with retired personnel. If a retired Marine is recalled to active duty from retirement, his record will be transferred to MMS/JUMPS through an automatic record interchange system.

4.3.4 The Joint Uniform Military Pay System, or JUMPS, is integrated with MMS but only at Kansas City. It is another 1200-byte segment of the combined JUMPS/MMS master file record which may also contain up to three additional 2400-byte segments of text or notes useful in establishing an

audit trail. This text is cleared out quarterly. While JUMPS contains data elements which are also present in the MMS record, as well as data elements unique to JUMPS, the latter are almost entirely concerned with pay, allowances, and other financial matters not appropriate to the SRS data base.

4.3.5 The RAMS [9] data base is the starting point for a new recruit. On his first day he is given a personal interview. At one depot the resulting information is put directly on a disc file from a keyboard by the interviewer. By means of a CRT display the correctness of the resulting Accession Transcription Form (ATF) is verified by the interviewer while the recruit is still present. The submission of the ATF to the RAMS update process causes the initial RAMS data record to be created for this recruit and added to the RAMS file. In addition, certain of the data elements are submitted to the MMS file updating process causing the creation of the initial MMS record. Furthermore, because this kind of event is one of a special kind called "critical," a TRS data record is created for the current cycle of statistical records. The MMS and TRS files are discussed in more detail in separate sections below.

The RAMS record, once created shortly after a recruit arrives at boot camp, then becomes part of the RAMS file for that camp. One file is maintained at San Diego and another at Parris Island. At the two depots, during the remainder of the recruit's stay there, the RAMS record is updated from time to time in one of three ways. The first is by card input, as for the Aptitude Area scores which are carried in both the RAMS and MMS files or for initial medical data such as color perception and blood type which are carried only in RAMS. The second is by input from the COBRA solution (based on the Aptitude Area Scores and in many cases other information) which recommends all entry level assignments and causes orders to be prepared for the Marine to his next station. The third is by submission of unit diary entries.

At the end of his boot camp training the recruit is either graduated or discharged. In either case the recruit's data record is removed from the RAMS file and added to the RAMS history file. At present, the record remains on the history file for 12 months and is then discarded. It is believed that there is a plan to change the procedure to keep the records

of the history file indefinitely. The history files are now being received periodically from both depots and are being kept at HQMC pending the procedure change.

4.3.6 The CAMS file is intended to be a counterpart to RAMS for officers [1]. However, it has been in existence for a much shorter time than RAMS and has not yet reached the level of reliability of RAMS. The data content of CAMS is different from RAMS in several respects. Potential officers, for example, do not have test scores.

4.3.7 The MMS data base consists of a 1200 byte segment of the combined JUMPS/MMS system. The JUMPS portion was described in 4.3.4. The MMS system has been on line since 1 October 1971 and has used Social Security Number (SSN) for identification in every record since 1 January 1972. MMS grew out of the old Personnel Accounting System (PAS) which used serial numbers for identification. Serial numbers are present in MMS records for personnel who had PAS records and served after MMS began, but for a Marine who was finally discharged before MMS came on line there is not necessarily a known SSN. MMS is a time-slice type data base. It always represents the best snapshot that exists of the active duty portion of the Marine Corps, although the picture is probably never completely accurate at any given time. Besides the current generation of MMS, several preceding generations are kept on file as are also the year-end generations. The updating of this data base is discussed in Section 4.4.

4.3.8 The TRS data base consists of records created during the MMS update process whenever a "critical" change has been made to the MMS record. The 240 byte record contains double snapshots representing the before and after contents of ten data elements and single snapshots of about fifty other data elements. These records do indicate the effective date of the critical change and, therefore, TRS is a true historical event type data base. These records are in existence back to 1961 and thus bridge both PAS and MMS, but not all types that were generated have been retained. More detail is to be found in Section 4.4 where the MMS updating procedure is discussed.

4.3.9 The COHORT file consists of most add and drop records for first termers. There are seven kinds of add records and five kinds of drops. These record types represent the most important of all change types including drop as deserter and join from desertion, drop to reenlist and drop to change status from officer to enlisted or enlisted to officer. Once a month the selected kinds of add and drop records are extracted from the TRS accumulation for that month, and a new COHORT record of 90 characters is created from the 240 characters of the TRS record. These new COHORT records are merged by SSN with the old COHORT file to create the latest generation of COHORT. From this generation many profiles of the current month's crop of enlistees are computed showing the mix by educational level, race, mental group, and other characteristics. While COHORT is very valuable in its own right it has no value as a source of an SRS data base because all its data elements are taken from TRS. If any of these same data elements are needed by SRS, they will be taken from the earlier source.

4.3.10 Of the nine data files with which we started only MMS, TRS, RAMS, and CAMS were not rejected as possible sources for an SRS data base. RAMS and CAMS were discussed above in 4.3.5 and 4.3.6. It seemed that RAMS would be an excellent starting point for the construction of the SRS data base. More than enough data was contained in the RAMS record which seemed to be well designed and well maintained. Furthermore, almost all future enlisted Marines would go through boot camp and cause a RAMS record to be created. Similarly, new officer records could be taken from CAMS. This would allow the capture of more detailed information concerning each Marine's first weeks, such as the complete set of test scores and the number of days between accession and graduation or failure at boot camp for enlisted men. The main problem with this procedure was that a substitute source of the same data had to be found for all Marines whose service predated RAMS and CAMS. Records for the latter group would have to be constructed from MMS and TRS. It was also felt that a new officer's record might be more accurate in MMS than in CAMS since MMS is the source of the Visual Audit Sheet (VAS) provided at each new station. Reaction to the VAS produces correction data for erroneous data elements in MMS. For these reasons, it was decided to abandon the idea of using RAMS and CAMS as principal data sources for an SRS data base.

4.4 Updating the MMS and creating TRS.

With the sources of input to the creation of an SRS data base now confined to MMS and TRS, it will be useful to examine the process of updating MMS and creating TRS records. This should give some insight into the problem of rate generation.

4.4.1 The update process begins usually in a unit such as a company where a change to a Marine's MMS record is necessary, for example, because he has been promoted. The change is listed on a unit diary form according to precise rules given in the Personnel Reporting Instructions Manual (PRIM) [8]. The unit diary is then typed in a form suitable for automatic scanning by an optical character reader (OCR). This document is forwarded to one of the Satellite Data Processing Installations (SDPI) where it is subjected to rigorous syntax and consistency checks. The SDPI has a copy of all or part of MMS and can catch an inconsistency like promotion to E6 when the present grade according to MMS is E4. If the SDPI does not reject it, the information on the document is passed on by AUTODIN to Kansas City where the MMS updating is to be carried out. Here the unit diary action is subjected to further tests. If these tests are also passed, the changes are stored on magnetic tape. After a period of time, all changes which have passed the tests are used to update MMS and a cycle is considered to have ended. For each change, the MMS record is altered and a flag is set in the record to indicate that at least one data element has been changed. If this change is one of 77 critical type transaction codes (TTC), there will automatically be generated one of 46 type change code (TCC) records of which the TRS data base is comprised. A list and brief description of these TCC's is given in Appendix 2. All transactions (TCC records) created during that cycle are sent on magnetic tape to HQMC accompanied by a copy of all MMS records that have been altered in any way during the cycle, regardless of whether or not the change was a critical one. This constitutes a best case.

4.4.2 The unit diary action may have been rejected either at the SDPI or at Kansas City and sent back to the unit where it originated for correction. In the worst case, it may bounce back and forth between the unit and the SDPI several times before passing inspection there, only to be rejected at Kansas City. The point is that TRS records contain both the effective date of the change and the date on which the MMS record was actually changed, called the

touched record date, and these two dates can be rather widely separated. In any case, the MMS is incorrect for the time between the two dates. If the lag time were roughly the same for all changes, say 25 to 35 days, MMS would always represent a fairly accurate snapshot of the actual end strength one month earlier than the date of that generation of MMS. Unfortunately, the range of lag time is very great. A computer program was written to create a distribution of lag time by TCC. The complete sets of TRS records, except for leave records, for each of the eight months May to December 1973, were tested. An abbreviated set of results is shown in Appendix 1 where the rows represent different TCC's, the columns are the eight different months, and the values are the percentages which had a lag time of sixty days or less. It will be noticed that there is a large variation not only between different TCC's but also for some TCC's such as A8 between the eight months. Some lag times exceed one year.

4.4.3 One problem which has arisen with MMS-TRS is that of missing transactions; missing in the sense that a critical change was reflected in the latest MMS file without the presence of a corresponding TRS record. After Kansas City was notified and while waiting for the cause to be found and corrected, personnel at HQMC created a program to compare the previous generation of MMS with the new MMS and TRS records of the cycle. Whenever the new MMS record had a change of certain critical TCC'S without a corresponding TRS record, a TRS record was created on the spot, identified as originating at HQMC, and merged with the TRS file.

4.4.4 The TRS records of each new cycle received from Kansas City are merged at HQMC with generation zero of the cycle hold file (CHLD), producing a new generation [15]. Each week this accumulation becomes the weekly file (RWSF) and a new CHLD is begun. Each RWSF is merged with generation zero of the weekly hold file (WHLD) producing a new generation. Each month this accumulation becomes the monthly file (RMSF) and a new WHLD is started. All CHLD, RWSF, and RMSF files contain a single ascending sequence of SSN's. A new semi-annual file (YHLD) is started in January and July of each year. Each month when the RMSF is produced, that month's data is also appended to the YHLD until five months' data is accumulated. When the sixth month's RMSF is produced in June or December, it, plus the current YHLD, are combined

to produce the semi-annual historical file (RMHF). This file contains six different sequences of SSN's. RMHF files are in existence from May 1961 to the present. All those preceding 1 January 1972 are PAS-RMT files converted to MMS and contain service numbers rather than SSN's. Files beginning in calendar year 1972 contain SSN's and are sequenced by SSN within each month. The PAS portion contains over 4.2 million records on 49 reels of magnetic tape.

4.4.5 At the present time, the computation of rates over a fixed interval of time is a time-consuming process. At the least, it requires that the numerator be obtained by selecting the proper TCC's from the TRS file for the fixed interval. Because of the time lag problem discussed in Section 4.4.2, it is necessary to select these TCC's from several later RMHF's to take care of the stragglers. If the time lag distribution were fairly constant, this problem could be ignored by selecting according to the cycle date rather than by effective date, but with the month to month variation in time lag such a sample could be severely biased. The problem of finding the denominator is different, since the lack of a TCC of the same type is not countable from TRS. In most cases, the denominator is a function of the average end strength of a particular subset of the MMS file. For example, the rate of promotions to E4 would probably be computed as the number promoted during the interval over the number eligible for such promotion. Counting the eligibles cannot be done using TRS only. Whenever the calculations require the matching of TCC's, that is, both kinds of events are necessary, the TRS file must be sorted by SSN, TCC. Sorting is time-consuming and therefore expensive. Another problem is the fact that many data elements can change in value without causing the creation of a TRS record. If the data element is present in TRS, the changed value will show up in the next TRS record to be created, although the effective date of the changed value will not be known. If the data element is not present in TRS, the change will show up in MMS, but again without the effective date.

4.5 Source and characteristics of a new data base.

In Section 4.4 various aspects of the process of reporting and preserving information on changes in personnel records were examined. It was seen that the only readily available source of change data was TRS, a by-product of the updating of the master file by MMS according to PRIM. We have looked at the

problems of missing TCC's, long lag times, and the sequences in which the TRS records are stored in the tape library. We have seen that TRS is not adequate to supply denominators for rate generation. On the other hand, TRS provides the only source of the effective date of changes, not all changes, but the most important ones. The problem of missing TCC's is being solved. There remain the problems of delayed creation of TCC's, inadequacy for computing denominators, incompleteness of the list of critical actions, and one not mentioned earlier, the extreme length of each TCC record. For the present purposes, the only data elements of interest are the SSN, the identity of the data element which has changed value, the new value, the effective date of the change, the cycle number (optional), and perhaps an extra ID field for double checking such as initials.

4.5.1 A new TRS could be designed to produce a complete range of changes wherein all changes for one Marine for one cycle are put into one TRS record of variable length with the SSN, initials, and cycle number occurring once and as many triplets as necessary each consisting of data element ID, new value, and effective date. This would widen the range of changes reported by TRS and simultaneously reduce the storage needed by a factor of a least eight. This statement is based on the present 240 byte TRS record created for each critical change and 30 bytes for the list of data elements given above. It is not necessary that the creation of these abbreviated TRS records be substituted for the present TRS process. But it does point out the direction to be taken for the SRS. Of the 30 bytes, half are used for identifying the Marine and the source cycle; the other 15 contain the essential change information. Why not organize these small information units? Before this can be done another important question must be settled. Should the proposed SRS data base be created in such a manner that it can be used as a time-slice file as well as a historical file? The answer is 'no' for at least two reasons. First, there are already adequate data bases for snapshot type information retrieval, in particular MMS and the Inquiry File (INQ) which is an abbreviated MMS record. Lately, INQ has been placed on one or two disc packs with some of its values indexed. The file can be queried directly through an on-site terminal, greatly reducing the average response time compared to when it was only on

magnetic tape. Further, INQ is now updated at each cycle by use of the replacement MMS records for that cycle, whereas the actual updating of MMS by the merge-replacement technique is now performed only once a week.

Second, the SRS data base, by definition, will have to contain much more information for each of certain data elements than a time-slice file. It must contain, in some form, each of the values assumed by the data element and the dates on which it assumed these values. For example, the SRS record for an E4 should contain the dates of rank for E1, E2, and E3 at least in addition to the date of promotion to E4. This produces a lot of information and also a space problem. Of course, in addition to the time-dependent data elements, the record must contain many static data elements for breaking out a particular rate by certain characteristics, for example, the rate of failure in boot camp by sex, race, educational level, and home state. In order not to aggravate the space problem, it is advisable to separate the two types of data bases. We now have concluded that MMS and TRS are to be the data sources and that SRS will be constructed as a historical data base but will contain static data elements for other reasons. The next problem is one of organization of information.

4.5.2 In considering the form of the SRS data base it is at once evident that one of the problems with the present historical files is that they are maintained in batches roughly corresponding to the months the changes were made in the MMS record. All critical events for any one Marine which are recorded by TRS are scattered throughout the TRS file segment which spans his career. For a typical four-year enlistee this segment covers about 2.4 million TRS records on 20-24 reels of magnetic tape. It is easy to see why this data base is not often used directly. The sheer problem of sorting 24 reels of tape by SSN in order to get all records for each Marine together is time-consuming and expensive in computer costs. Even if only a relatively small number of records are extracted from these reels and sorted, the extraction itself is costly.

If the problems of extraction and sorting could be done once only or avoided altogether, much efficiency of time and money would be gained. If all

the useful units of information could be gathered into one record of workable size for each Marine, that objective would be realized. We will adopt this as a working hypothesis with decisions already reached, with the result that the SRS data base will be constructed from MMS and TRS as a historical file containing some static data elements into a data base containing one record for each Marine.

4.5.3 For the selection of data elements we are led to the conclusion that only those events which cause the creation of a TRS record can be associated with effective dates. On the other hand, these are the very events deemed most critical by the designers of TRS. It will be possible to include enlistment, extension of enlistment, separation, reenlistment, grade changes including migrations between officer and enlisted status, unauthorized absence, and desertion. Changes in location (MCC/RUC) and in MOS can also be monitored, since all the above types of changes create TRS records.

4.5.4 It is obvious that data records of the type just described will vary greatly in the number of events which each is to contain. If we consider fixed-length records, the problem immediately arises of what to do if more events of a certain type occur to a given Marine than the space provided will hold. One could 'slide the time vector' so that the earliest events of that type were omitted but then some information would be lost. Another problem is that a fixed-length record must provide enough space for the thirty-year man's events and most of the corresponding space in a first termer's record will be empty. This problem is magnified by the fact that, at any one time, over 80% of the end strength consists of first termers. Both problems can be overcome by using variable-length records containing variable-length segments. With this technique, every Marine has all his ranks and dates of ranks in his record and no space is wasted. Other economies of space are strongly recommended such as replacing the six byte date in character form or the four byte date in packed decimal form by a two byte date in binary form, particularly since these records will contain a great many dates. Similarly, test scores can be condensed into one byte coded binarily.

4.5.5 The following schematic of a typical SRS data record is presented to clarify the concept of variable length records with variable length segments.

Part I - Data elements with fixed values such as SSN, sex, race, and

New data elements which have as their values L1,...,Ln , the lengths of the n variable segments to follow.

Some lengths may be zero.

The length of Part I is fixed.

Part II - Data elements and effective dates for first time dependent element, for example, grade.

Initial Grade

Date of Rank — The first pair must exist.

Second Grade

Date of Rank — The second and succeeding pairs may not exist.

.
.
.

nth Grade

Date of Rank

Parts III to n - Similar to Part II for time-dependent variables 2 to n . The total length of the data record is the sum of the lengths of the fixed and all the variable segments.

4.6 Building and maintaining the data base.

The creation and maintenance of the SRS data base will be fairly straightforward. Given a starting date for the file (the date 1 January 1972 seems a good choice), the MMS file as of that date will furnish all the original data elements for the fixed portion and the initial entry in those variable portions which cannot be of zero length. A computer program to construct this initial record will be needed.

To update this file, say once a month, two steps are necessary. Since we may expect that some of the changes will be joins we must first provide initial records for new recruits. This is done by the same program used above to create the original file. The transaction records are scanned until a new recruit join is found. The MMS record for this recruit is known to exist by the very presence of the TRS record for the join. The initial record is created from the MMS record and the scan of the transaction records continues. When all necessary initial records have been created the updating begins. The inputs are the SRS file, the TRS transactions, and the newly created file of

initial records. For each transaction of certain types, a data element value and the effective date of the value is added to one of the variable-length portions of the SRS record in its proper chronological order. This avoids the problem of sorting the TRS file. The program to perform this updating procedure must be created. If, for any transaction, there is a match with both SRS and the file of initial records, the SRS record is updated and the initial record is ignored.

4.7 Data elements of SRS (tentative).

SRS RECORD LAYOUT

FIXED-LENGTH AREA	BYTES	HMF DISPL
FIELD LENGTHS L1 TO L9	9	-
SSN	10	10
INITIALS	3	20
RACE	1	87
SEX	1	88
HOME - STATE, COUNTY	2	400
DATE OF BIRTH	2	167
PAY ENTRY BASE DATE	2	143
AFADBD	2	147
ACTUAL EAS	2	208
RECRUIT GRAD/SEP DATE	2	
RECRUIT GRAD/SEP FLAG	1	
MCC ENLISTED AT	3	
COMPONENT CODE	1	57
DUTY LIMITATION	1	84
MONTHS { ENLISTED FOR ACTIVE SERVICE IF REGULAR }		214
MONTHS { ENLISTED FOR ACTIVE SERVICE IF RESERVE }	1	215
PAP CODE	1	286
DUTY STATUS	1	287
STRENGTH CATEGORY	1	285
CITIZENSHIP	1	329
DATE ACCEPTED FIRST COMMISSION IN MC.	2	910

SRS RECORD LAYOUT (Cont'd)

FIXED-LENGTH AREA	BYTES	HMF DISPL
# DEPENDENTS AT FIRST ENTRY MC	1	
# DEPENDENTS CURRENT	1	550
CIVILIAN EDUCATION AT 1ST ENTRY MC	1	336
CIVILIAN EDUCATION CURRENT	1	
PROGRAM ENLISTED FOR	1	421
	54	

	VARIABLE-LENGTH AREAS	BYTES	HMF DISPL	AREA LENGTH
A1	SCORES			18 or 0
	ACB SCORES (AA)	16	461	
	AFQT OR DERIVED AFQT	1	493	
	AFQT FLAG	1	495	
A2	OFFICER DATES			4 or 0
	DATE DESIG MIL PILOT	2	862	
	DATE FIRST COMM MC	2	910	
A3	ENLISTMENT/SEPARATION			12n
	SOURCE OF ENTRY DIGITS	4	395	
	DATE OF ENLISTMENT	2	159	
	SEPARATION CODE	3	866	
	REENLISTMENT INDICATOR	1	869	
	SEPARATION DATE	2		
A4	EXTENSIONS			6 or 0
	TOTAL MONTHS EXTENDED	1	218	
	TOTAL NO. OF EXTENSIONS	1	227	
	DATE OF LATEST EXTENSION	2	232	
	MONTHS LATEST EXTENSION	1	230	
	FILLER	1		

SRS RECORD LAYOUT (Cont'd)

VARIABLE-LENGTH AREAS		BYTES	HMF DISPL	AREA LENGTH
A5 GRADES				6 + 4n
PERMANENT GRADE (LATEST)		1	247	
FILLER		1		
GRADE		2	262	
DATE OF RANK		2	266	
A6 MOS				4 + 2n
BILLET MOS	OCC. FLD.	1	342	
	SPEC.	1		
PRIMARY MOS LATEST		2	346	
DATE		2		
PRIMARY MOS PREV		2	350	
DATE		2		
PRIMARY MOS 2ND PREV		2	354	
DATE		2		
A7 LOCATION				8 + 8n
MCC	(ALPHANUMERIC)	3	90	
RUC	(PACKED DEC)	3	93	
DATE	(BINARY)	2		
A8 UA AREA				0 or 6
NO. DAYS	UA	2		
NO. DAYS	LATEST UA	2		
NO. TIMES	UA	1		
NO. TIMES	DESERTER	1		
A9 EVENTS				0 or 6n
EVENT TYPE		1		
FILLER		1		
'TO' DATE		2		
'FROM' DATE		2		

4.8 Adequacy of SRS data base.

We now look again at the objectives of this concept study to see how well the proposed SRS data base meets them. The general task objective (1.1) was to determine the data requirements for SRS and RG. The response was given in Section 4.7 and includes what are thought to be the most useful static elements and a very flexible plan for keeping track of values which change over time.

4.8.1 Present and future statistical requirements (1.2.1) for time-dependent data elements are fairly well covered by the present 77 TTC's although a suggestion was made in Section 4.5.1 which would extend the scope of the reporting so that more of the changes to MMS would appear in TCC records. While some TCC's may appear to be superfluous from the point of view of SRS, such as HW, which reports height, weight, or color of hair, this information may be needed elsewhere in HQMC. It would be useful to have an additional TCC to enable one to determine the dates of entry to and release from confinement as a result of a confirmed courts-martial sentence. Another TTC is needed to monitor progress at formal schools. It should indicate which school was attended, for how long, and whether the student passed or failed. This is our response to (1.2.1).

4.8.2 All present TCC's will not be used in the creation of the data base defined in 4.7 but, because of the flexibility of the system, it is advisable to keep all present TCC's in any future TRS for possible incorporation into the SRS as it may exist at that time. This is our response to (1.2.2).

4.8.3 The data elements which pass from a TRS statistical record to an SRS record are in general only the new value and effective date for the addition to one of the time-dependent areas. For example, in a reenlistment TCC only the new source of entry code, the length of enlistment, and the effective date would be taken from the TCC. Referring back to the SRS record layout in Section 4.7, notice area A3. If this is the first time the Marine has reenlisted, area A3 will have contained at least the five elements listed there representing his first enlistment and his first separation. The length of the segment would be 12 bytes. The reenlistment data, source of entry code

and date of enlistment will be added to those twelve making a total of eighteen bytes. The length of enlistment of the new hitch will replace the length of the former one in the fixed length area. This is our response to (1.2.3).

4.8.4 The only other manpower-related data bases necessary to the creation or upkeep of SRS are MMS and RAMS which may be used to provide the initial SRS records. This is our response to (1.2.4). This process was described in Section 4.6.

4.8.5 The reconstruction or reformatting of past statistical TRS records for inclusion in SRS was covered in 4.6 where it was shown that the starting date was flexible, requiring only an MMS snapshot file and the TRS files subsequent to the date of the MMS file. However, we have seen that for changes to MMS made prior to 1 January 1972 the TRS consists of reformatted PAS-RMT data records which are sequenced by service number (4.4.4). With suitable modifications due to missing data elements an additional SRS-type data base could be constructed for the PAS portion of the file if the MMS snapshot is available. This data base could be used to record events dating back to as early as 1961, but in the other direction to not later than 31 December 1971 because of the lack of SSN's for all serial numbers. It is recommended that SRS begin with initial values as of 1 January 1972 to include a maximum of data and still avoid the serial-SSN problem. This is our response to (1.2.5).

4.8.6 The selection of rates for permanent residence on the proposed RG (1.2.6) is considered inapplicable to the system being designed.

4.8.7 The constraints imposed for computer use in Section 1.3 can be met subject to the following comments. Using maximum elapsed execution time (wall clock time) as a criterion for automatic job execution, it is always possible for a job to be terminated before it has hardly begun execution, due to failure to hang the correct tape reels, neglecting to ready devices, or inability of the system to allocate peripherals. It is expected that the longest job will be that of creating the initial records for new recruits from the updated MMS file which requires the passing of about nine reels of

tape, but this step can be greatly shortened if the update records themselves are made available. Core storage is not expected to exceed 150,000 bytes per job step. Fifty cylinders of disc storage will be adequate, but the limit of three disc areas, regardless of their size, is difficult to interpret in reference to a system using spooling of unit records. This constitutes our response to Section 1.3.

4.8.8 The system being described does indeed strike a balance between all-inclusiveness and economy. The TTC's and data elements have been chosen from high usage items of particular importance and significance, a requirement which was noted in Section 1.4. By far, the most interest was shown in attrition or retention rates, promotions, extensions, time in grade, by MOS, occupational field, reason for separation, mental group, and area-aptitude scores as shown by the interviews held within the various divisions (see 4.1.1 to 4.1.14) and by the Rate Dictionary [16]. The latter is a compilation of the rates needed by various manpower models, RIP [10], STRAFE [11], and SAS [12], for example, as input parameters. An analysis of the 118 rates listed showed some rates which are set by policy (average tour length as a ground first termer, #33), some which are of inventory type (proportion of aviators that are first termers, #40), and some which are now inapplicable (ICT and post-ICT monthly attrition rate, #83). ICT is now part of boot camp training. Of the balance of the rates in the dictionary, SRS will support the majority. In particular, it will support the many rates therein which concern attrition or retention in one form or another.

4.8.9 There are no changes which must be made to MMS or TRS except the TTC's requested in 4.8. However, SRS is designed to adapt to changes therein which are made by others. By the same token, it may be found that the value of SRS can be increased by the creation of other new TCC's so as to support new variable-length segments. It would be desirable to continue to be able to request such new TCC's, providing that the cost of producing them is not greater than the benefits of having them. This responds to Section 1.5.

5. CONCLUSIONS

Based on the arguments presented in this paper four major conclusions have been reached. These conclusions are listed below with reference to the sections containing the arguments.

5.1 Choice of computer site.

The SRS system should be designed to operate on the HQMC on-site computer which requires that the four constraints given in Section 1.3 must be met. The reason is given in Section 3.4.

5.2 Choice of existing data bases as sources of data elements for SRS.

The SRS system should depend exclusively on the MMS, RAMS and TRS data bases for source data. Specifically, MMS or RAMS should provide initial values for data elements while TRS should be used to accumulate subsequent values. The reasons are given in Sections 4.3 and 4.4.

5.3. Type of data base needed.

The SRS data base should be of the historical type which is described in Section 2.4. It should consist of a single record for each Marine containing both static and dynamic data elements and effective dates of the values of the dynamic elements for reasons given in Section 4.5.2. The SRS data base should be focused only on the solution of time-dependent problems for reasons given in Section 4.5.1. The types of dynamic data elements to be included are given in Section 4.5.3 and a tentative data record layout is in Section 4.7. A method for creation and maintenance is briefly sketched in Section 4.6.

5.4 Meeting the study objectives.

The overall objectives of the study have been met. This conclusion is supported in Section 4.8.

6. RECOMMENDATIONS

In view of the concepts presented in the preceding sections of this report, it is recommended that the report be accepted by Headquarters, Marine Corps as the basis for completing the design phase and beginning the programming phase of this project.

APPENDIX 1

TABLE 1

PERCENTAGE OF TRANSACTIONS WITH LAG TIME
OF 1-60 DAYS BY TCC AND MONTH (1973)

TCC	MONTH							
	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
AN	16.6	97.5	46.7	49.4	12.4	42.5	60.1	82.0
AO	100.0	99.7	100.0	97.6	98.5	96.6	94.7	96.1
A4	92.1	92.7	94.6	85.7	89.9	91.2	92.6	93.6
A5	91.7	100.0	100.0	26.5	35.6	92.1	86.5	71.4
A6	99.8	99.8	94.5	80.2	83.1	59.7	25.4	36.0
A7	88.8	83.4	94.3	92.0	90.4	87.9	92.8	90.6
A8	69.2	100.0	84.4	99.5	80.0	11.4	52.6	90.0
DB	97.9	98.4	98.8	98.5	98.9	98.6	99.1	98.6
DC	96.2	95.9	96.1	96.6	97.0	96.9	97.5	95.6
DE	89.5	91.9	90.8	91.8	89.5	89.7	89.6	90.3
DH	100.0	100.0	90.9	100.0	100.0	100.0	100.0	100.0
D2	98.1	98.0	97.3	98.9	97.7	97.9	99.3	99.2
D3	100.0	100.0	100.0	100.0	96.7	97.4	100.0	100.0
D5	99.2	100.0	97.9	99.6	96.8	97.8	97.7	96.2
EE	91.5	90.2	92.4	91.9	92.7	92.4	87.2	91.5
EP	100.0	87.5	100.0	100.0	100.0	85.7	87.5	100.0
ER	97.9	92.7	97.2	95.0	96.4	97.6	94.3	95.9
EX	94.1	100.0	97.6	100.0	94.4	87.9	88.2	80.6
E1	95.3	97.9	96.3	90.4	94.2	96.2	95.7	95.3
E2	61.0	64.4	94.4	88.8	26.4	42.3	37.2	48.5
E4	98.1	100.0	84.6	96.2	83.7	92.6	96.0	96.9
FE	100.0	100.0	100.0	100.0	100.0	100.0	96.7	100.0
GW	99.3	99.5	99.2	99.6	99.7	99.5	99.7	97.9
HL	100.0	100.0	100.0	100.0	100.0	98.4	100.0	100.0
HW	86.4	100.0	100.0	96.7	96.7	96.3	100.0	100.0
R1	81.0	81.8	95.0	91.8	94.1	91.6	62.6	84.6
R2	91.8	92.5	94.6	85.5	89.8	91.1	92.2	93.5
R3	91.1	95.4	95.9	97.7	96.9	94.9	91.7	97.3
R4	80.6	83.5	87.1	82.7	79.4	84.6	85.6	85.6
R5	69.2	100.0	76.3	99.0	80.0	11.4	26.3	88.3
T9	91.1	100.0	100.0	100.0	100.0	100.0	100.0	100.0

TABLE 1 (Cont'd)

TCC	MONTH							
	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
UA	96.2	94.5	95.6	98.0	97.3	97.8	92.0	97.8
U1	85.6	88.6	94.3	94.2	96.4	95.9	94.3	94.5
U5	86.3	89.5	95.0	92.2	92.1	91.9	88.4	86.9
U7	84.5	86.9	94.3	84.2	100.0	91.5	95.7	89.5
U9	82.3	83.2	89.9	93.6	90.3	86.7	83.6	100.0
TOTAL	93.4	94.7	96.0	95.4	93.7	93.8	92.2	93.7

APPENDIX 2

TCC	Meaning or usage.
AN	Not a true accession. Used to replace a lost record or to replace one which had an incorrect SSN.
A0	Initial entry.
	Immediate reenlistment but not in the reporting unit from which separated.
	Reentry but not immediate.
	Reentry from retired list.
A4	Immediate reentry in same status (officer or enlisted) and in same reporting unit. Always accompanies an R2 (see below) dated one day earlier.
A5	Gain to counteract an erroneously reported separation.
A6	Reservist reporting for active duty.
A7	Join from desertion.
A8	Immediate reentry in opposite status (officer or enlisted). Always accompanies an R5 dated one day earlier.
DB	Enlisted promotion (meritorious).
DC	Disciplinary reduction.
DE	Grade correction.
DH	Enlisted promotion (temporary).
DY	Administrative reduction from temporary rank.
D2	Officer promotion or enlisted permanent or probational promotion.
D3	Administrative reduction from other than temporary rank.

D5	HQMC grade and date of rank correction.
EE	Extension of enlistment executed.
EP	Reenlistment bonus paid for extension of enlistment.
ER	Variable reenlistment bonus awarded.
EX	Involuntary extension of enlistment.
E1	Component code change.
E2	Proficiency pay awarded or terminated.
E4	Extension of enlistment cancelled.
FE	Duty limitation change.
GW	MOS change.
HC	To temporary active duty.
HD	From temporary active duty.
HL	Current source of entry code change.
HM	From sick.
HN	Strength category change.
HW	Height, weight, or color of hair change.
H4	To sick.
H5	PAP code change.
JD	Joining entry.
LV	Leave entry.
R1	Separated - will not reenter. Includes discharges, resignations, deaths, and retirees.
R2	Separated for immediate reentry in same status and same reporting unit. Accompanies an A4 (see above).
R3	Released from active duty and transferred to reserves.
R4	Dropped as a deserter.

R5 Separated for immediate reentry in another status. Accompanies an A8 (see above).

TR Transfer

T9 Contract legal agreement change.

UA Unauthorized absence, less than 24 hours of single day.

U1 To unauthorized absence.

U5 From unauthorized absence.

U7 From unauthorized absence with absence excused.

U9 Absence excused. Previously reported as unauthorized absence of less than 24 hours of single day (see UA, above).

The above information is a condensation of part of Reference [6].

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